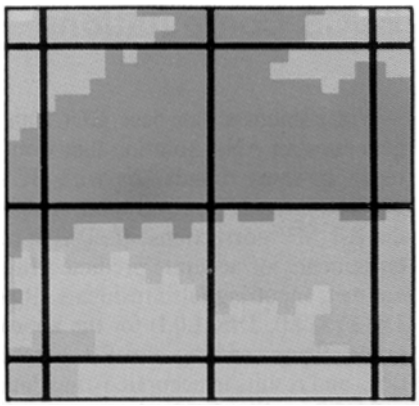
Fire Support in Computer-Simulated Joint Exercises in Europe



Simulation Series

by Major Mark J. Lowery

The past 10 to 12 years have brought sweeping changes in almost every aspect of US Army operations. We changed from the 200-point officer evaluation report (OER) to the current system that has the dreaded pyramid. We lost the jeep and gained the high-mobility, multipurpose wheeled vehicle (HMMWV). New weapons systems have been introduced (the multiple launch rocket system for one) and old ones shelved (the Redeye for one). But nowhere has change been more apparent than in the area of computer simulations.

Computers have changed the way the Army trains for war. Before, we conducted a command post exercise (CPX) using a large map board with pieces moved by infantry and armor personnel. The FA commander positioned, moved and fired the artillery pieces and used a string to determine a weapon system's range. Computers kept account of the ammunition fired, gave a battle damage assessment for each volley and provided unit attrition data. Because each player was trying to shoot and move continuously, computer operators became overwhelmed, causing a two- to four-hour backlog on inputting fire missions into the system. Even with these problems, this was a vast improvement over using dice and assessment tables.

Joint Combat Simulations

We now have fully interactive computer simulations that replicate almost every aspect of war. Some simulations test the effectiveness of one weapon system against another. Others provide a means for commanders and their staffs to exercise against a "live" opponent with the combat action simulated by the computer. They allow an extension of CPXs and command field exercises (CFXs).

Currently, two computer simulations in Europe are used extensively in the CPX or CFX modes. They're the joint exercise simulation system (JESS) and the distributed war-gaming system (DWS).

JESS

The computerized battle simulation system, JESS, is designed to drive joint readiness exercises. The system supports Army staffs down to the brigade level and Air Force staffs to the Allied tactical operations center (ATOC) level. (The ATOC is a combined-forces air control center that might support several corps.)

The controllers provide a realistic interface between the training audience and the computer battle simulation. They accept orders from the trainees, enter them into the program and report the simulated battle outcomes to the trainees.

GWSM

The Warrior Preparation Center (WPC), a joint initiative of the US Air Force and Army in Europe, runs DWS. The Center provides senior NATO commanders a means to exercise army or group battle staffs at echelons above corps as if directing actual combat.

The distributed war-gaming system consists of several sub-simulations. One runs the air battle, one the sea battle, one holds the follow-on forces and one fights the ground battle. This article addresses the ground battle simulation, called the ground war simulation model or GWSM, which focuses on the use of fire support, and compares it to JESS.

Similarities

Despite their different missions, JESS and DWS are similar in their approach to fire support. For corps level and below, JESS provides better detail and ease of use while the ability of GWSM to maintain large data bases and large maps provides better echelons-above-corps training.

Similarities of both systems regarding fire support are that both—

- Have a fire mission order form listing the unit, weapon, ammunition type, number of rounds and target location.
- Can assign direct support missions where the computer automatically fires the artillery for each supported unit engaged in combat.
- Use a six-sided or hexagonal grid system, called HEX, to model the ground data. The road networks are between the centers of the HEX grids while the obstacles (rivers, mines, etc.) are along the edges of the HEXs.
- Interface players in a field location (or simulated field location) with controllers who enter the movement, fire and other orders for the units.

Advantages of Each

Even though both simulations use artillery in a similar manner, there are certain advantages each has over the other.

Advantages of JESS over GWSM are:

- JESS shows the grid system on the computer screen, while GWSM doesn't. GWSM requires cell participants to update two or more map systems constantly.

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It's harder to make units move in GWSM because it's difficult to locate the roads, bridges and obstacles for movements.

- JESS' interaction between the display and the command input is easier.
- The HEX grid system in JESS better displays roads, bridges, rivers and other obstacles on the screen. There's also a representative map of the terrain in the background.
- JESS has a shoot-and-scoot option crucial to the Field Artillery and shortens the time needed to input movement orders.
- JESS allows multiple impact points for each fire mission, thereby allowing us to attack a linear or dispersed target.
- The resolution of the JESS simulation is better than GWSM.

Advantages of GWSM over JESS are:

- GWSM allows for a greater number of participants.
- GWSM has a larger map data base and operates from numerous sites throughout the world.
- GWSM simulates deep operations and follow-on forces attack better than JESS.

Common Problems

Both simulations have certain problems that detract from the overall packages. The problems fall generally into two types. The first is over-generalizing aspects of fire support and maneuver. The second problem is errors in the computer programming that cause incorrect, improper and unexpected results. The second type of problem is generally corrected by the managers of the particular simulations. But the first set of problems impact on the fire support portion.

The resolution scale of the HEX grid system in the JESS and GWSM computer models is too large to allow standard shoot-and-scoot activities. In the JESS model, each HEX grid is three kilometers wide, and the GWSM HEX grids are 3.2 kilometers across. This doesn't allow for a jump of one to two kilometers, which a platoon or a launcher section might accomplish.

JESS doesn't play radars, and GWSM does a poor job of interjecting radar play into the simulation. Counterfire in GWSM is modeled as a fire mission percentage over a given period of time. This didn't work during a recent Allied exercise.

Neither simulation models the terrain very well. Line of sight is not considered, so it isn't an advantage to gain the high ground. The HEXs replicate either mountains, open, wooded or urban terrain, or some other movement-degrading characteristic. This punishes a small firing unit that could take tertiary roads between firing points quickly.

Another problem is reporting. Because each corps, division or battalion commander might have different emphasis, each generates different reports. Many of the required bits of information, although present in the computer simulation, are either hard to access or inaccessible to the user. For example, if the commander wants to know the number of missions and rounds fired, the operator must either track the data manually or query several reports to get the information.

A major problem plaguing both simulations is the slow response for battle damage assessments. The simulations assume a mission is "observed" if it is within one HEX of a friendly unit with observers. The observer generates a battle damage assessment at the time of the fire mission, but it doesn't reach the firing headquarters until the computer processes the mission, sometimes hours later.

Simulations' Effectiveness

With all the problems of the two simulations, one wonders if they model indirect fire accurately enough to be effective training tools for the commander. This question can only be answered when you consider the purpose of the simulations.

The purpose is to train battle staffs as if they were directing actual combat. The artillery does move, fire and attrit units and damage the enemy in battle. The purpose isn't to train the Field Artillery but to train the battle staffs of the combined-arms, multi-branch AirLand Army.

Future Improvements

In the future, simulation programmers will correct many of the existing problems. With more memory and faster computer processors, modifications to the simulations and new simulations will better model all aspects of the future battlefield. But programmers only can make changes based on constructive feedback from all participants in the computer-simulated exercises.

Fire supporters should notify the software programmers of errors and changes to be incorporated into the next version of the simulations. Commanders should remember the purpose and limitations of the simulations. Each response cell should be adequately manned with knowledgeable personnel.

Predicting computer technology for the next 10 to 20 years is impossible. Technology is changing so fast there might come a day when the large map boards of the past with small symbols representing units will be replaced with holographic map boards that allow the user to see only those units acquired in a real battle.

This is an exciting time for the Army and will prove challenging for everyone in uniform. Our future holds greater promise for increased readiness through the use of advanced computer simulations.

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